Overview of WTS Building 64

Building 64 Basement Sump Water Treatment System (WTS) is located in the west end of Building 64 at the General Electric Aircraft Engines (GEAE) Plant, Lynn, Massachusetts. The WTS is designed to treat potentially contaminated water, which collects in sumps located in the rotor balance area (RBA) basement and in the former product development laboratory (PDL) basement of Building 64. Historic sampling and analysis have revealed that the collected water from the sumps has intermittently contained trace levels of polychlorinated biphenyls (PCBs) and petroleum hydrocarbon products, which are removed by the treatment process.

The WTS consists of four sumps, an Equalization (EQ) Tank, an Oil/Water Separator, an Oil Holding Vessel, a Head Tank, a Sand Filter, two Granular Activated Carbon Vessels (GAC-1 and GAC-2), and a Backwash Tank.

Treated water from the WTS is discharged to the publicly-owned treatment works (POTW) via the Bennett Street Outfall [Outfall 001]. The WTS is designed to operate at a nominal flow rate of 10 gallons per minute (gpm) but will operate at intermittent peak flow rates of approximately 15 gpm.

Because liquids potentially containing PCBs are treated by the WTS, all personnel performing maintenance work on this system must have had the 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training as required by the Occupational Safety and Health Administration (OSHA) [29 CFR 1910.120(e)]. System maintenance is performed by a designated contractor with appropriate training. System maintenance includes backwash of the Sand Filter and GAC Vessels; change-out of the Sand Filter media; change-out of the GAC Vessels media; repair of pumps, float switches, valves, flow meters, etc.; and process modifications or upgrades.

Process and effluent samples are analyzed by a certified laboratory. Sampling is done for process control monitoring purposes only.

The spill cleanup and waste disposal contractor performs emergency response to spills when needed, performs routine inspections of the Oil Holding Vessel, and routine waste disposal per the Toxic Substances Control Act (TSCA) regulations for PCBs.

System Description and Process Flow

The WTS is designed strictly for the treatment of water that collects in four sumps: two adjacent to the RBA operations control room, designated as Sump 1 (75 gallons) and Sump 2 (600 gallons); one sump in the east end of the RBA basement, designated as the RBA Sump (60 gallons); and one sump in the PDL basement with a remote source at the east end of the STTV vehicle, designated as the PDL Sump (130 gallons). Figure 2-1 shows a plan view of Building 64, the WTS, and the sumps

Water collected in Sump 1 is transferred to Sump 2 with the activation of Pump 1 by a Sump 1 level switch. Water collected in Sump 2 is transferred to the EQ Tank (2,500 gallons) with the activation of Pump 2 by a Sump 2 level switch. Likewise, water collected in the PDL Sump activates Pump 5 and is transferred into the EQ Tank. The EQ Tank provides for more continuous and balanced flows to the treatment system. Once the water level in the EQ Tank reaches a predetermined normal level, Pump 3 activates and transfers the EQ Tank water to the Oil/Water Separator. Liquid from the RBA Sump is transferred directly to the Oil/Water Separator, (i.e., the EQ Tank is bypassed). This bypass of the EQ Tanks is because the volume and flow rate from the RBA Sump are relatively small compared to those of Sump 2 and the PDL Sump. In addition, oil collected in the RBA Sump has historically contained higher PCB concentrations, and it is preferable to transfer this PCB oil directly to the Oil/Water Separator.

The Oil/Water Separator is a coalescing type and is designed to minimize the amount of insoluble (free) petroleum products entering the Sand Filter and GAC Vessels. The oil phase is drawn off automatically from the Oil/Water Separator via an oil drain port and flows by gravity into the Oil Holding Vessel. The water phase flows by gravity out of the Oil/Water Separator effluent port and into the Head Tank (375 gallons). Once a predetermined normal liquid level is reached in the Head Tank, Pump 4 activates and transfers water from the Head Tank through the Sand Filter and the two GAC Vessels for treatment. The Sand Filter minimizes fouling the GAC Vessels due to suspended particulate matter. Treated water exits the GAC Vessels via discharge piping connected directly to the Bennett Street wastewater network.

A piping manifold, integrally mounted adjacent to the GAC Vessels, allows for series, parallel, or intermittent flow through the GAC Vessels by manually changing the valve positions. The only permitted and approved mode of operation is series flow through both GAC Vessels. Series flow provides the necessary control to maintain effluent water quality. Sampling ports positioned at influent, midpoint, and effluent locations on the piping manifold allow for sample collection to check for system compliance and performance. A flow totalizer is located prior to Valve # 20 on the effluent line from the GAC Vessels.

The only approved method for managing the two GAC Vessels is “lag-lead”. With this approach the newest (in service the least amount of time) GAC media is the lag vessel, and the oldest (has been in service the longest) GAC media is the lead vessel. Break-

through on the lead vessel is determined by a combination of calculated useful life and mid-point performance sampling. Once break-through has been confirmed, the GAC media in the lead vessel ONLY is changed-out. The media in this vessel is now the newest material, therefore this vessel becomes the lag, and the former lag vessel (with the older media) becomes the lead. At this point the system may be valved back on line.

The piping and valves also provide for manual backwashing capability of the Sand Filter and GAC Vessels as may be required. There may be times when submicron particles and/or colloidal material are not removed by the Sand Filter and may enter the influent stream to the GAC Vessels. Solids will act to foul or plug the Sand Filter and GAC media resulting in reduced contaminant adsorption efficiency, increased operating pressures, or reduced flow rate, and ultimately resulting in the premature change-out of the media. If solids collect in the Sand Filter or in the GAC Vessels, the affected vessel should be backwashed. An increased pressure drop across the vessels or a reduced flow rate is indicators that solids have collected in the Sand Filter or in the GAC Vessels. Backwashes for Sand Filter and GAC Vessels are performed a minimum of once per quarter – more often as indicated by process performance data.

During backwash of any of the three vessels, spent wash water must be captured by valving to the backwash tank. And, to ensure that no by-pass occurs, Valve #20 must be closed and locked out. Ideally, spent backwash should be kept in the Backwash Tank between 4 to 24 hours to allow solids to settle. At that point Valves #118 & 119 may be opened to gravity flow the wastewater upstream to Sump 2.

Settleable solids are periodically removed by the System Maintenance Contractor as part of this task. Solids must be pumped from the bottom of the Backwash Tank, contained and appropriately disposed of. It may not be necessary to remove solids after each backwash event, but care should be taken to avoid over accumulation as this could result in reintroduction of separated solids into the upstream sump.

Operation of Control Panels

The WTS has two control panels: a master control panel located in the RBA operations control room and a remote slave panel located adjacent to the Oil/Water Separator. The master control panel allows for manual or automatic operation of certain pumps and related level control devices. A GE Fanuc Series 90 Programmable Logic Controller (PLC) located inside the master control panel controls the automatic functions of Pump Stations 1, 2, 3, and 4. The master control panel is equipped with pump status indicator lights for Pump Stations 1, 2, 3, and 4; Hand/Off/Automatic selector switches for the pumps.

The remote slave panel contains an audible alarm device, alarm status indicator lights, an alarm acknowledge button, and pump stop selector switches for Pump Stations 1, 2, 3, and 4. This panel has been incorporated to allow for personnel at the WTS to observe alarm status indicators, silence the audible alarm, and to stop a pump station from operating if required.

A red alarm beacon has been mounted outside of Building 64 next to the overhead door adjacent to the WTS containment area. This alarm beacon is part of the high-level alarm circuits and is designed to alert outside personnel of a possible problem with the WTS.

An alarm display for the WTS is provided on the Power House control room console. This display receives status information from the PLC via the Power House communications network. The alarm display, illustrated in Figure 4-1, provides both high and high-high alarm status for Sump 1, Sump 2, the EQ Tank, the Head Tank, and each of the three Temporary Holding Tanks. The alarm display shows the status of the Audible Enunciator and the Alarm Beacon. The alarm display provides a notification of any trouble with the network communications.

Equipment Specifications

Spill Containment

A containment pan (measuring 19 feet long by 11 feet wide by 10 inches deep) holds the Oil/Water Separator, Oil Holding Vessel, Head Tank, Backwash Tank, Sand Filter, and GAC Vessels. The capacity of the containment pan is approximately 1,300 gallons. The net capacity of the containment (1,560 gallons) is sufficient to handle a worst case failure, which is the capacity of the backwash tank (500 gallons). The following is a listing of system components and the liquid holding capacity of each.

• Oil/Water Separator	300 gallons
• Head Tank	375 gallons
• Oil Holding Vessel	55 gallons
• Sand Filter	105 gallons
• Backwash Tank	500 gallons
• GAC Vessels	225 gallons
Total Volume:	**1,560 gallons**

NOTE: The volumes reported for the Sand Filter and GAC Vessels are the estimated interstitial volumes with each vessel containing a sand or GAC media.

The EQ Tank has a secondary spill containment vessel that measures 124-inches diameter by 56-inches high and has a capacity of approximately 2,950 gallons.

Oil/Water Separator

- Type: Coalescing
- Manufacturer: U.S. Filter (formerly Lancy International)
- Model No.: 8200
- Dimensions: 62"L x 28"W x 58"H
- Hydraulic Capacity: Up to 20 GPM
- Construction: Steel